REMARKS

In paragraph 15 of the Office Action, claim 15 was rejected under 35 U.S.C.§112, first paragraph. In response, claim 15 has been canceled and this ground of rejection is now moot.

In paragraph 5 of the Office Action, claims 1, 3-6, 8-12, 14 16 band 17 were rejected under 35 U.S.C.§103(a) as being unpatentable over Nagata et al. (Nagata) in view of Inda et al. (Inda).

Reconsideration is requested.

Claim 1points out a solid electrolyte and a positive electrode that exist in a mixed state in the interface between the solid electrolyte and the positive electrode and/or the solid electrolyte and the negative electrode exist in a mixed state in the interface between the solid electrolyte and the negative electrode.

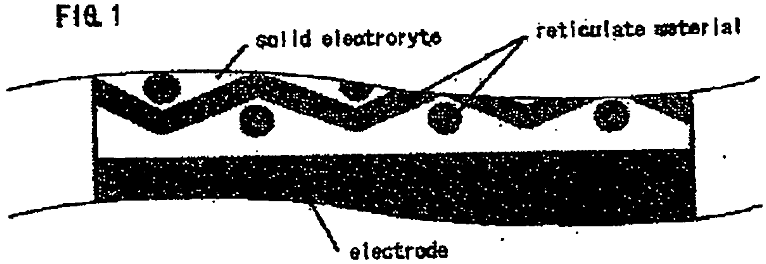
The mixed state is formed by coating the electrode layer and casting the solid electrolyte directly on the electrode layer without an intermediate drying step. Forming the electrolyte layer as a thin film and causing the solid electrolyte and the positive electrode to form in the mixed state in the interface between the electrolyte layer and the electrode layer results in reduced resistance to conductance in the lithium ion inorganic substance. The result is a lithium ion secondary battery having high capacity and a high output along with excellent charging and discharging characteristics.

The Examiner stated in the first paragraph of page 4 of the Office Action that the solid electrolyte mixture is used because f its good adhesion to the electrodes (col. 1, lines 42-46) and one of ordinary skill in th art would recognize that a mixed state of solid electrolyte and electrode would inherently occur between the electrolyte and electrode of Nagata since in order for adhesion to take place, the electrolyte material would find its way into the roughened surface of the electrode material/

The solid electrolyte of Nagata is obtained by filling the opening of the reticulate material with a mixture and drying the reticulate material. Unless there is a mixture in a layer of sufficient thickness on each side of the reticulate material when the solid electrolyte and the electrode are adhered together, a sufficient adhesion area cannot

be obtained due to the unevenness of the surface configuration of the reticulate material and as a result, good adhesion cannot be achieved. IN Nagata at col. 5, lines 42-436, the text points out that if there is a thickness of 5-25μm of the mixture layer on each side of the reticulate material, such inconvenience dose not exist and good adhesion can be obtained as shown in the following Fig. 1:

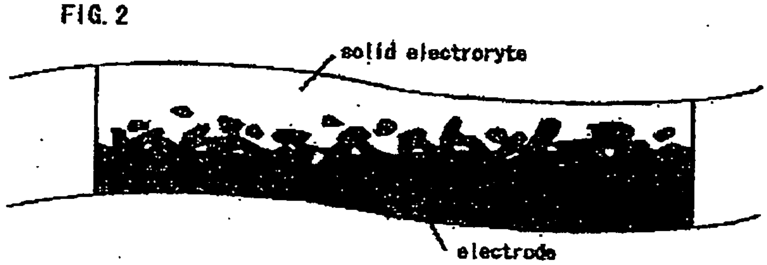
FIG. 1



Since there are various modes of adhesion such as adhesion by intermolecular forces, covalent bonding and mechanical structure, the disclosure of Nagata does not suggest that there exists a state of mixed interface between the solid electrolyte and the electrode.

The interface between the solid electrolyte and the electrode of the present invention is illustrated by the following Fig. 2

FIG. 2



By making the electrolyte layer thin and also providing a mixed interface between the electrode and the electrolyte as shown in Fig. 2, the resistance to lithium ion conduction can be reduced and a lithium ion secondary battery having high capacity and a large output with good charge-discharge cycle properties is obtained. This concept is not made obvious by Nagata or by Inda .

In the Inda patent, it is mainly the electrolyte that carries out ion conduction and since the electrolyte has a high ion conductivity, it is not necessary to reduce the thickness of the electrolyte to 20μm or less. In the specification at page 1, beginning at line19 and extending over to page 2, line 5, it was disclosed that a gel polymer electrolyte required a minimum thickness in order to have sufficient mechanical strength to avoid breakage or hole formation and this thickness was 30-80 μm. The Inda patent disclosed that the reason for making the electrolyte with a thickness of 100μm or below is to secure a broad area of electrolyte per unit volume but does not disclose that the purpose of reducing the thickness of the electrolyte is to reduce the resistance to ion conduction (Cf. col. 3, lines 10-16). The Inda patent does not disclose any example of an electrolyte that has a thickness of less than 50 μm.

For these reasons, it is requested that this ground of rejection be withdrawn,

In paragraph7 of the Office Action, claim 13 was rejected under 35 U.S.C.§103(a) as being unpatentable over Nagata et al. (Nagata) in view of Inda et al. (Inda) further in view of Munshi.

Reconsideration is requested.

The Nigata and Inda patents have been distinguished froim the claimed invention above. Munshi discloses an electrolyte that is made of a polymer, a salt and an ion conducting material and the lithium ion conductive inorganic substance. There is no suggestion of coating the electrolyte onto an electrode which results in a different structure from the "flexible, dry, non-tacky" solid electrolyte of Munshi. Claim 13 defines a different and unobvious structure from that taught by the cited references in that claim 13 is dependent on claim 8 which is dependent on claim 1. Therefore all of the arguments advanced above with regard to the patentability of claim 1 are also applicable to claim 13. For these reasons, it is requested that ground of rejection be withdrawn..

An early and favorable action is earnestly solicited.

Respectfully Submitted,

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